AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1   1.   (Currently amended) A method for supporting read-only objects

2 within an object-addressed memory hierarchy, comprising:

3   receiving a request at a translator to access an object, wherein the request

4 includes an object identifier for the object that is used to reference the object

5 within the object-addressed memory hierarchy, and wherein the translator

6 converts an object identifier and offset into a corresponding physical address and

7 converts the request to access an object into a request for the corresponding

8 physical address;~~translates between object identifiers (used to reference objects in~~

9 ~~an object cache) and a physical addresses (used to address objects in main~~

10 ~~memory)~~;

11   using the object identifier to retrieve an object table entry associated with

12 the object;

13   if the request is a write request,

14   examining a read-only indicator within the object table

15   entry,

16   if the read-only indicator specifies that the object is a read-

17   only object, performing a corrective action to deal with the fact that

18   the write request is directed to a read-only object.

1   2.   (Original) The method of claim 1, wherein if the request is a read
2   request, the method further comprises using a physical address from the object
3   table entry to access the object in main memory.

1   3.   (Original) The method of claim 1, wherein performing the
2   corrective action can involve causing a fault handler in the requesting processor to
3   perform the corrective action.

1   4.   (Original) The method of claim 1, wherein performing the
2   corrective action can involve:
3   obtaining a writable copy of the object, clearing the read-only indicator to
4   indicate that the object is no longer read-only, and updating the writable copy of
5   the object with data from the write request;
6   updating a remotely located master copy of the object with data from the
7   write request;
8   terminating the requesting process because the write request is not
9 ´ allowed; and
10   if the request is directed to a debugging breakpoint, pausing the requesting
11 process and clearing the read-only indicator.

1   5.   (Cancelled)

1   6.   (Previously presented) The method of claim 1,
2   wherein prior to receiving the request at the translator, the request is
3   initially directed to the object cache;
4   wherein if the request causes a hit in the object cache, the object is
5   accessed in the object cache and the request is not sent to the translator; and

6   wherein if the request causes a miss in the object cache, the request is sent

7   to the translator.

1   7.   (Original) The method of claim 6, further comprising making a

2   given object read-only by:

3   setting a read-only indicator associated with the given object to indicate

4   that the given object is read-only;

5   causing all object caches within a local cache-coherent domain to flush any

6   modified cache lines of the given object out to main memory;

7   whereby subsequent upgrades of the given object from read-only status to

8   writable or modified status in any caches within the local cache-coherent domain

9   must go through a translator.

1   8.   (Original) The method of claim 7, wherein causing all object

2   caches within the local cache-coherent domain to flush any modified cache lines

3   of the given object out to main memory involves executing a read-with-intent-to-

4   only-read (RWITOR) instruction on each cache line of the given object.

1   9.   (Original) The method of claim 7, wherein the given object can be

2   made read-only in response to a request received from outside the local cache-

3   coherent domain.

1   10.   (Previously presented) The method of claim 1, wherein the

2   translator includes hardware to translate between object identifiers and physical

3   addresses.

1   11.   (Currently amended) An apparatus that supports read-only objects

2   within an object-addressed memory hierarchy, comprising:

4

3   a receiving mechanism configured to receive a request at a translator to

4   access an object, wherein the request includes an object identifier for the object

5   that is used to reference the object within the object-addressed memory hierarchy,

6   and wherein the translator <u>converts an object identifier and offset into a</u>

7   <u>corresponding physical address and converts the request to access an object into a</u>

8   <u>request for the corresponding physical address;</u>~~translates between object~~

9   ~~identifiers (used to reference objects in an object cache) and a physical addresses~~

10   ~~(used to address objects in main memory);~~

11   a translation mechanism configured to use the object identifier to retrieve

12   an object table entry associated with the object; and

13   a corrective action mechanism, wherein if the request is a write request,

14   the corrective action mechanism is configured to,

15   examine a read-only indicator within the object table entry,

16   and

17   if the read-only indicator specifies that the object is a read-

18   only object, to perform a corrective action to deal with the fact that

19   the write request is directed to a read-only object.

1   12.   (Original) The apparatus of claim 11, wherein if the request is a

2   read request, the translation mechanism is additionally configured to use a

3   physical address from the object table entry to access the object in main memory.

1   13.   (Original) The apparatus of claim 11, wherein the corrective action

2   mechanism is configured to cause a fault handler in the requesting processor to

3   perform the corrective action.

1   14.   (Original) The apparatus of claim 11, wherein performing the

2   corrective action can involve:

3   obtaining a writable copy of the object, clearing the read-only indicator to

4   indicate that the object is no longer read-only, and updating the writable copy of

5   the object with data from the write request;

6   updating a remotely located master copy of the object with data from the

7   write request;

8   terminating the requesting process because the write request is not

9   allowed; and

10   if the request is directed to a debugging breakpoint, pausing the requesting

11   process and clearing the read-only indicator.

1   15.   (Cancelled)

1   16.   (Previously presented) The apparatus of claim 11, wherein the

2   apparatus includes the object cache;

3   wherein prior to receiving the request at the translator, the request is

4   initially directed to the object cache;

5   wherein if the request causes a hit in the object cache, the object is

6   accessed in the object cache and the request is not sent to the translator; and

7   wherein if the request causes a miss in the object cache, the request is sent

8   to the translator.

1   17.   (Original) The apparatus of claim 16, further comprising a read-

2   only configuration mechanism configured to make a given object read-only by:

3   setting a read-only indicator associated with the given object to indicate

4   that the given object is read-only; and

5   causing all object caches within a local cache-coherent domain to flush

6   any modified cache lines of the given object out to main memory;

7   whereby subsequent upgrades of the given object from read-only status to

8   writable or modified status in any caches within the local cache-coherent domain

9   must go through a translator.

1   18.   (Original) The apparatus of claim 17, wherein the read-only

2   configuration mechanism causes all object caches within the local cache-coherent

3   domain to flush any modified cache lines of the given object out to main memory

4   by executing a read-with-intent-to-only-read (RWITOR) instruction on each cache

5   line of the given object.

1   19.   (Original) The apparatus of claim 17, wherein the read-only

2   configuration mechanism makes the given object read-only in response to a

3   request received from outside the local cache-coherent domain.

1   20.   (Previously presented) The apparatus of claim 11, wherein the

2   translator includes hardware to translate between object identifiers and physical

3   addresses.

1   21.   (Currently amended) A computer system that supports read-only

2   objects within an object-addressed memory hierarchy, comprising:

3   a processor;

4   the object-addressed memory hierarchy;

5   an object cache within the object-addressed memory hierarchy;

6   a translator that translates between object identifiers, used to address

7   objects in the object cache, and physical addresses, used to address objects in

8   main memory;

9   a receiving mechanism within the translator configured to receive at the

10   translator a request to access an object, wherein the request includes an object

11   identifier for the object that is used to reference the object within the object-

12   addressed memory hierarchy, and wherein the translator <u>converts an object</u>

13   <u>identifier and offset into a corresponding physical address and converts the</u>

14   <u>request to access an object into a request for the corresponding physical</u>

15   <u>address;</u>~~translates between object identifiers (used to reference objects in an object~~

16   ~~cache) and a physical addresses (used to address objects in main memory);~~

17   a translation mechanism within the translator configured to use the object

18   identifier to retrieve an object table entry associated with the object; and

19   a corrective action mechanism, wherein if the request is a write request,

20   the corrective action mechanism is configured to,

21   examine a read-only indicator within the object table entry,

22   and

23   if the read-only indicator specifies that the object is a read-only object, to

24   perform a corrective action to deal with the fact that the write request is directed

25   to a read-only object.